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CONTENTS

Naturalism and the Concept of Matter: A CAMPBELL GARNETT. 477

Thoughts on the Problem of Mechanism: CHARLES E. WHITMORE 489

Book Notes 499

HERBERT ELLSWORTH CORY, *The Significance of Beauty in Nature and Art.*

RAMÓN INSÚA RODRÍQUEZ, *Historia de la filosofía en Hispanoamerica.*

ERNESTO CODIGNOLA, *Illuministi, Giansenisti e Giacobini nell'Italia del Settecento.*

ARNE NÆSS, *Interpretation and Preciseness.*

Current Journals 503

Notes and News 504

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THE JOURNAL OF PHILOSOPHY

NATURALISM AND THE CONCEPT OF MATTER

CONTEMPORARY naturalism, says Mr. Randall, maintains a double protest, against nineteenth-century materialism as well as against supernaturalism.[1] Yet Mr. Nagel says that "perhaps the sole bond uniting all varieties of naturalists is that temper of mind which seeks to understand the flux of events in terms of the behaviors of identifiable bodies"[2] and Mr. Edel names "an appreciation of the primacy of matter" as one of the "central points of naturalism as a philosophic outlook."[3] Both this double protest and the neo-materialism held as an intermediary position rest, however, on the still more fundamental conviction that the only way to reliable knowledge is by strict adherence to the empirical methods of observation, classification, and inductive generalization that have advanced the natural sciences. The quasi-materialistic ontology seems to thinkers of this school to be a conclusion entailed by reliance on a naturalistic methodology. It is the validity of this conclusion that I wish here to question. It seems to me to be due to a failure to clarify sufficiently the concept of matter and to analyze adequately the nature of mental process.

In their reply to Mr. Sheldon's charges of materialism,[4] Messrs. Dewey, Hook, and Nagel distinguished two kinds of materialism.[5] The first ("reductive materialism," which they reject) maintains "that every psychological term is synonymous with, or has the same meaning as, some expression or combination of expressions belonging to the class of physical terms."[6] The second (which they accept) denies this but "maintains that the occurrence of a mental event is contingent upon the occurrence of certain complex physico-chemico-physiological events and structures."[7] Mental entities,

[1] *Naturalism and the Human Spirit*, ed. by Y. H. Krikorian, Columbia University Press, 1944, p. 363.

[2] *Ibid.*, p. 211.

[3] *Ibid.*, p. 65.

[4] "Critique of Naturalism," this JOURNAL, Vol. XLII (1945), pp. 253–270.

[5] "Are Naturalists Materialists?" this JOURNAL, Vol. XLII (1945), pp. 515–530.

[6] *Ibid.*, p. 518.

[7] *Ibid.*, p. 519.

however, "are not additional things which are *substantially* distinct from the properties and behaviors of spatio-temporal objects in their organized unity," they are "qualities and behaviors displayed by physical things when they are properly organized." [8]

The causal relation between physical and mental entities thus conceived is said to be analogous to the relation between the properties of hydrogen and oxygen atoms and those of water.[9] The existence of water and its properties is dependent upon the existence of hydrogen and oxygen atoms combined in a certain way. But the "structured object" (water) with its properties, produced by this combination, is "not an *additional* thing," not "substantially distinct" from the hydrogen and oxygen atoms as organized in the form of water.

This analogy seems to me to contradict what has been said in rejection of "reductive materialism," though the contradiction is hidden by use of the vague word "properties." The observable properties of any physical thing may for our purpose be divided into two groups, (*a*) sensory or qualitative, (*b*) operational and relational. The latter consist of the changing spatio-temporal relations of its constituent elements and its capacity to effect spatio-temporal change in other physical things. The former are dependent on the latter, and especially upon their effect on the sense organs of living things. In considering the dependence of the properties of water upon those of hydrogen and oxygen, therefore, it is only the operational and relational (i.e. dynamic) properties we need consider. But the relation between the dynamic properties of water and those of oxygen and hydrogen is "reductive" in the sense of "reductive materialism" as defined above. The chemist and physicist postulate that every term referring to the dynamic properties of water is "*synonymous with,* or has the *same meaning as,* some expression or combination of expressions belonging to the class of terms" referring to the dynamic properties of hydrogen and oxygen.

The analogy holds good so long as we confine our attention to non-dynamic properties. The same physical elements which, organized into separate atoms of hydrogen and oxygen, display one set of sensory qualities will, if organized into molecules of water, display another; and no set of terms descriptive of the sensory qualities displayed by the water could be synonymous with any expression using only the class of terms referring to the sensory qualities or other non-dynamic properties of oxygen and hydrogen. Analogously the neo-materialist postulates that the same physical

[8] *Ibid.*, p. 521.
[9] *Ibid.*, p. 521.

elements which, organized into inorganic matter, display one set of qualities (assuming that the *esse* of qualities is not *percipi*) will, if organized into a living brain, display another set of qualities, such as pain and a sense of beauty or of guilt; and no set of terms descriptive of these latter qualities displayed by the living brain could be synonymous with any expression using only the class of terms referring to the sensory qualities or other properties of the inorganic matter. Thus far the analogy holds good, assuming that inorganic matter has any such qualities at all except as sensed by some organism. But what the analogy demonstrates thus far is of no special significance. It merely expresses the fact that qualitative change is everywhere correlated with operational change and that qualities, so far as they are different, are irreducibly distinct in the sense defined. It is just as impossible to "reduce" red to blue as it is to "reduce" pain to red.

The important question is as to whether the analogy holds good of the operational properties of mind—the *seeing* of red, the *feeling* of pain, the anticipating, recognizing, interpreting, and other mental operations. Are these both irreducibly distinct from the dynamic properties of inorganic matter and yet dependent on them as their necessary and sufficient condition? Is there any analogy for this assumed non-reductive yet causal relationship to be found in the relation of the operational and relational (i.e., dynamic) properties of water to those of hydrogen and oxygen atoms? The answer must be that there is not. For the latter relation is *both causal* and *reductive* in the sense defined. If the conclusions and assumptions of physics and chemistry are correct, then, for any expression descriptive of the operational and relational properties of water, there is a set of expressions, using only the class of terms referring to the operational and relational properties of oxygen and hydrogen, which is synonymous with it.

Reductionism therefore holds good between the operational and relational properties of water and those of oxygen and hydrogen. Does it also hold between the operational and relational properties of brain process and the operational and relational properties of mental process? If the naturalist says it does then he must give up his claim to have transcended reductionism so far as the vitally important operational properties of mind are concerned. If it does not then he must admit that there is no useful analogy between the causal dependence of the new properties of complex molecules on those of their constituent elements and the alleged causal dependence of these new mental properties of a living body on its previous physico-chemico-physiological properties.

But to give up this analogy would be tragic for the neo-material-

ist hypothesis. For this analogy is the only reasonable justification for the hypothesis that "minds are adjectival or adverbial of bodies,"[10] i.e., that the necessary and sufficient conditions of the occurrence of mental states and events are to be found in physico-chemico-physiological events and structures. For it is a first principle of that scientific method to which all naturalists claim to adhere that philosophy shall entertain no hypothesis which is not a *vera causa*,[11] i.e., supported by good analogy. The emergence of new species in the course of evolution contains even less analogy to the emergence of the mental from the physical. It is merely another case of modification of physical structure and effects correlated with modification of perceptible sensory qualities. Where else shall the naturalist go for a verified analogous case of causal relation which is not reductionist in its references to non-qualitative properties? These are the familiar analogies and they will not do. The naturalist, therefore, if he is to be true to scientific method, must either return to reductionism (which would be philosophical suicide) or surrender his quasi-materialism.

The second horn of this dilemma, however, should not prove as unacceptable as at first it might seem. It will not be necessary to resort to a psycho-physical dualism of substances in order to do justice to the distinction of mental and physical. The duality is merely one of process—but of processes which are irreducibly distinct. The reason why reductionism is unacceptable is not that mind alone contains qualities, for it may well be that qualities akin to those we sense belong, unsensed, to physical things. Nor is it that mental qualities (e.g., pain and pleasure) are so different from sensory qualities that they must be placed in a realm apart—the mental. Reductionism fails because mental activity (or behavior) is not reducible to description in terms of the activity (or behavior) of physico-chemical entities. No statement descriptive of the changing relations of any number of physical elements can ever be synonymous with such mental terms as "anticipate," "feel," "believe," "discriminate," or "attend." But to recognize that these are unique and irreducible *events* is not to assert that some immaterial substance is involved. What it does require, however, is a clarification of the notion of matter that will surrender the last vestiges of the Greek atomism.

The ghost of the Greek atom seems still to live in the two statements of our three naturalists (*a*) that "the qualities and behaviors

[10] *Ibid.*, p. 521.

[11] John Dewey, *Logic*. New York, Henry Holt & Co., 1938, p. 3. For further discussion of this point see my article "Scientific Method and the Concept of Emergence," this JOURNAL (1942), pp. 477–486.

called mental or spiritual . . . are not additional things which are *substantially* distinct from the properties and behaviors of spatio-temporal objects in their organized unity,"[12] and (*b*) that "minds are adjectival and adverbial of bodies."[13] Evidently they consider that mental process must be adverbial or adjectival of *something* and if not of body then of something *substantially* distinct from body. The body is not, of course, regarded as itself a substance. It too is adjectival, being an organized unity of "spatio-temporal-objects." But what are the ultimate particular elements of which bodies are organized unities? If these ultimate particulars are *events* rather than substances (and, being ultimate, are not adjectival or adverbial to anything else), then may not the same be true of mental events? A mind may be an organization of mental events, as a body is an organization of physical events. The two kinds of events may well exist and be irreducibly distinct, yet causally related, without either kind, in any of its organizations, constituting a sufficient and necessary condition of the other.

To point to the logical possibility that the category of "event" may be ultimate and yet require division into two irreducibly distinct kinds does not, however, prove that this is the case. Thus far I have only very briefly indicated the evidence on which such a conclusion rests. I have sought to show that the quasi-materialism at present so popular is as unsatisfactory as the reductive materialism it has replaced, but I have not yet shown that an ultimate duality of events can be made more compatible with scientific knowledge than an ultimate dualism of substance. Nor have I yet fully presented the evidence on which rests the contention that there is an ultimate duality of mental and physical events. In order to keep close to contemporary naturalist theory as I develop the argument on these two points I will take up the interpretation of mind presented by Mr. Krikorian in *Naturalism and the Human Spirit*. It is, I think, a fair and able presentation of the predominant naturalistic point of view.

Mr. Krikorian repudiates the reductionism of nineteenth-century naturalism, as do all the other philosophers of this school whom we have quoted. He also recognizes that this will involve some reinterpretation of traditional views of matter and of its mechanism. "Because life is within the medium of mechanism it does not follow that it can be defined in terms of mechanism."[14] "Life is a purposive behavior, and our task will be so to define life that it may dwell in the world of mechanism and be of it, yet

[12] This JOURNAL, Vol. XLII, p. 521.

[13] *Ibid.*, p. 520.

[14] *Naturalism and the Human Spirit*, p. 245.

without being turned into mechanism or without mechanism being turned into it."[15]

This calls for a broad interpretation of mechanism as consisting in "non-teleological causal relations, that is to say, invariant correlations" between "physico-chemical entities."[16] The "material world" is conceived as consisting of these physico-chemical entities thus organized and the teleological organization of life is accepted as empirically found—as arising within and depending on a "complex physico-chemical organization,"[17] continuous with the material, yet not reducible to it, the continuity being "from matter to mind, rather than from mind to matter." At this point Mr. Krikorian makes a statement which calls for much elucidation, but none is given. He says:

> Of course, if material organization can at a certain level show adaptive behavior and at another level thinking behavior, one must modify certain traditional views of matter; but it would still be true that life and mind are derivative, organizational concepts."[18]

What, then, is the new concept of matter that naturalism needs? Until it is clarified the naturalistic assumption of the primacy of matter is not merely unproved dogma; it is meaningless assertion with a misleading suggestion due to the older conception of matter now needing revision.

It is, I think, true that "life and mind are derivative, organizational concepts." The same is true of matter. But the question is as to what is being organized in each case and what accounts for the distinctive types of organization. Mr. Krikorian oversimplifies the problem by concentrating, throughout most of his essay, on life and mind as they can be observed in *another* person—the behavioristic approach. But "adaptive behavior" and "thinking behavior," as they can be observed in another person, are still merely modes of bodily behavior. And these peculiar modes of bodily behavior are, as he observes, superposed on the physiological and physico-chemical organization of the body as a new level of organization.

Even thus stated it is obvious that bodies capable of such organized reactions must be subject to influences other than those invariant, non-teleological correlations involved in his broadened conception of mechanism, and we search our physics and physiology wondering to which of the entities therein described such influences can belong. The case becomes much worse, however, when we turn

[15] *Ibid.*, p. 245.
[16] *Ibid.*, p. 244.
[17] *Ibid.*, p. 247.
[18] *Ibid.*, p. 248.

to consciousness. An anticipatory response, as seen in another person, is a high-level organization of physical entities that also have the characteristic organization of matter. But the act of anticipating, *as given to consciousness,* is something quite different. It, definitely, does *not* consist of a high-level organization of physical entities that also have the characteristic organization of matter. It includes a looking into the future, a reference to the absent and non-existent. We may take inventory of all the sensory data in all their present relations, and of all the physico-chemical events believed to condition their appearance, and we still have left out the distinctive act of referring to the future which is uniquely characteristic of anticipation.

We must therefore reject the view that the act of anticipation is a high-level organization of material entities. The movements of limbs, lips, tongue, etc., which constitute the observable anticipatory response do not constitute the act of anticipating which is given to consciousness. Neither is that act constituted by any group of incipient muscular movements and nerve reactions such as accompany thinking and can only be observed by the person making the anticipatory response. Neither can we say that the organization of molecular changes in the brain constitutes the conscious act of anticipation, involving as it does the reference beyond the present to the future, absent and non-existent. Neither can any collection of *present* images in consciousness constitute such an act. Indeed no *organization* of any entities which can in any sense be called physical can constitute such an act.

If the act of anticipating is not an *organization* of physical entities can it be an act of some single physical entity? This is to ask "Can the quantum (or whatever may be the ultimate unit) think?" This would seem to be impossible, for, if there is anything that physiological psychology has taught us it is that, whatever the brain may have to do with thinking, it is large areas of the brain, operating in some unified way, that are involved in a single act of thought.

The naturalistic possibilities, however, are not yet exhausted. Physical things are not made up of atoms moving in a void but of a system of events in spatio-temporal relation to each other. It is, of course, possible, for purposes of scientific prediction, to treat these events and relations in highly abstract terms. Both the events and their relations can be defined in terms of certain operations performed on perceptual objects in a laboratory; and description, prediction, and verification can be carried on in these terms. It is then possible to ignore the question as to *what* connects the perceptual objects since, *in these abstract terms,* we know

how they are connected. But it is a fatal philosophical error to assume that concrete perceptual objects are connected *by* these abstractions. The spatial relations of mathematical physics are adjectival to physical things—to pieces of laboratory apparatus. But the space these relations define, e.g., that between the sun and its planets, is not merely a void, sparsely dotted by a few clusters of atoms. It is the *connection* of these clusters. It is the *medium* within which the atoms operate, the *matrix* within which arises the display of qualities which we learn to correlate with concepts of physical bodies. And the most characteristic feature of these bodies as we learn to conceive them is that of a capacity for resistance which seems to consist of a set of tensions that we can refer to nothing other than the spatial field or medium itself. Space then is not non-being. It is a *field,* a three-dimensional reality within which occur the events (probably a system of changing tensions) that constitute what we call physical things and physical energy. Within this same three-dimensional reality occurs the changing display of qualities correlated with the electrodynamic changes. And within it also occur those time-transcending acts of anticipation that enter into the structure of a mind. It is nothing more than a hangover of the Greek atomism and the Cartesian dualism that makes naturalists feel that the philosophy of mind is confined to two alternatives, that mental process is a function either of a substantial soul or of the entities that constitute physical mass and energy. Physics has forced us to recognize that atoms do not move in a void, that space is real being, an extended field of activity, and that dynamic processes are changes in and of this extensive reality. Energy is space-time and space-time is space-activity. Why not recognize, therefore, that mental activity; e.g., what we are conscious of as an act of anticipation, is another kind of activity in and of the same field, another sort of space-activity? How the two forms of space-activity, physical and mental, are integrated, and how they are both related to the changing display of qualities in space, would then remain a matter for further empirical investigation.

Such an hypothesis is no mere unsupported speculation. The mental act of anticipating the future is not a simple physical event, but it is a real event of which we are clearly conscious. This leaves us with five logically open possibilities. (1) It (the mental operation) is a complex organization of physical operations that is "mechanical"—in Mr. Krikorian's sense of the term or whatever other sense physics may require for description of its subject-matter. Or (2) it is a mysteriously appearing higher organization of physical operations, the difference being merely one of organiza-

tion, not the addition of any unique kind of entity or event superimposed on the "mechanical." Or (3) it is an operation (change or activity) of the spatial field in which it occurs but of a kind different from the electro-dynamic operations of physics. Or (4) it is an operation of a non-physical, non-spatial entity, e.g., a soul. Or (5) it arises *ex nihilo* and disappears *in nihilum*.

These alternatives exhaust the possibilities. But the first two, as already shown, are not in accord with the known facts. The last two involve the invention of metaphysical entities or processes for which there is no other evidence. The third is in accord with all the facts and requires no unsupported metaphysical invention. Its adoption would save naturalism from the blindness that is always induced by clinging to a false hypothesis.

If we accept the view that mental activity (e.g., an act of anticipation) is a change in and of the spatial field, but an event not forming part of the "mechanical" order of physics, then the theoretical possibility of its relations to this "mechanical" order can be understood in empirically familiar terms. Both the physical event and the mental event are changes in the one medium, the spatial field. It is not surprising, therefore, if the course of physical events should be modified by the presence of the mental event in the same space. The mental event is conative, either in appetition or aversion. The change from one conative form to the other is correlated with brain changes from anabolism to katabolism and vice versa. It may well be that, in the delicate balance of biochemical structures, the physical change in the universal medium (space) is facilitated or retarded by the mental change in the same medium. The physical changes determine changes in the qualities displayed for the attentive processes, thus affecting changes from appetition to aversion and vice versa. The attentive processes are teleologically organized and their responses, affecting the metabolism of the brain cells, establish teleological modification of the responses of brain and nervous system.

This interpretation of the problem of body and mind is entirely naturalistic in that it refuses to postulate the existence of any entities or processes not empirically found in nature, and in that it interprets the relations of these entities and processes entirely in accordance with the principles of scientific method as used in the natural sciences. But is it in accord with the naturalistic doctrine of the primacy of matter? It certainly would be if the spatial field is called "matter" or "material." In justification of such terminology it might be pointed out that physical events are space-time or space-activity. But if mental events are also a form of space-activity then there would be the same sort of justification for

calling space "mind." So it would be much better to recognize that, as between the material and mental, the spatial field is neutral. The material and mental are not attributes of space as a neutral substance; they are operations of space as a neutral entity. A piece of matter (e.g., a molecule or a planet) is a certain kind of organization of the "mechanical" operations of space. Much of space is empty of matter but even empty space contains events (such as radiant energy) which are "material" in the sense that they may enter into the structure of matter and belong with it in the same "mechanical" organization which constitutes the physical universe. The total organization of the physical universe is "mechanical" and "material" in the senses defined but it does not constitute one piece of "matter."

This terminology would seem to be required by the above interpretation of body and mind; and it means that for naturalism the concept of the primacy of matter is thus far an open question. We have two sorts of evidence for the existence of mental activity. The first is that of our own immediate experience and memory. The second is in the behavior of those bodies containing cells with molecules of a sufficiently delicate balance to be controlled by a local change in the non-physical activity of which the spatial field is capable. But whether the non-physical (i.e., mental) activity of this field occurs in ways and regions beyond the reach of these two sorts of evidence is a question upon which it is very difficult to obtain scientific assurance. However, the more closely we examine the unit of physical process (the quantum) and the unit of mental process (e.g., an act of anticipation) the less likely does it appear that any organization of the one type of entity could produce the other. This being the case any doctrine of the primacy of matter or the primacy of mind is pure dogma unjustifiable by the naturalistic approach to philosophy.

Indeed, we can go further than this and say that a strict application of the naturalistic approach will lead to the rejection of both these extreme dogmas. A mind is empirically discovered to be a series and system of feeling-striving processes, only partly conscious, teleologically interconnected, one purposive feeling-striving process giving birth to the next, the new process in part carrying forward the purposive effort of the old and in part developing new purposive tendencies in response to its environment.[19] These mental events have their being within the world of physical events and sensory qualities. They are directed upon those events and qualities as objects. In their very nature they presuppose the

[19] I hope, in a later article, to develop and further defend this conception of mind.

existence of a world of such more or less malleable objects. They do not produce the objects and manifest only very slight control of them, and that only under very special conditions. A highly organized mind grows in this way from the minimal and probably unconscious feeling-striving processes of a single-celled organism. There is nothing in all this to suggest that the whole process, mental and physical, is produced and dominated by a highly organized mind. On the contrary there is much to discredit the suggestion that the physical is produced by the mental or that the mental life of individuals is controlled throughout its development by whatever mental life may have been original.

On the other hand, there is also nothing in the whole known set of events to suggest that the vast series and system of feeling-striving processes of the terrestrial organic world could have been originally produced by anything other than a feeling-striving process. With the recognition that feeling-striving is a function of the spatial field, not of physical units or physical organization, there is no reason to think that it was. The special control of small pieces of matter by localized appetition and aversion, and the consequent development of organisms with individual minds and bodies such as have appeared on earth, is a phenomenon made possible by the very special physico-chemical conditions on the surface of the earth. But since it is the spatial field that feels the tensions and qualities of these bodies we must not let the limitation of our consciousness blind us to the fact that it (the spatial field) may feel the tensions and qualities of other physical processes elsewhere, or everywhere. The ultimate parent of the mental life operative on earth (assuming a single source) must have been either a feeling-striving process that made an absolute beginning in a world hitherto devoid of such processes, or it was one which was a part of a system of such processes having a primal status in the cosmos together with the system of physical events and qualities. In the light of the facts adduced the latter hypothesis is distinctly the more reasonable. But (as many naturalists will quickly point out) the recognition of a primal system of feeling-striving processes in the cosmos does not of itself justify the assumption that such processes are organized into a cosmic, rational consciousness that could be called divine.

In conclusion we may raise the question whether space, as here conceived, can be defined in terms of Mr. Dennes's three categories of event, quality, and relation? There is a class of relations called spatial and I think that space, as here conceived, may be defined as a continuum which contains all qualities and contains and relates all events. But "relates" is here a verb. When this relating

is analyzed into the various dimensions and directions found in it and these are named and classified as "spatial relations" such relations are mere abstractions. The space that really *relates* all existent events is not composed of a mere totality of these abstractions. It is the perceptible field within which the analytic activity of the attentive process distinguishes the primary spatial relations and out of which it abstracts them.

In the terms of Mr. Broad's analysis [20] the concept of space that seems to be here required is "substantival" rather than "adjectival," and "relational" rather than "absolute." It is "substantival" in that it rejects the notion that space exists only as a characteristic of material things or events, asserting instead that the properties we classify as material temporarily characterize various parts of a world spatial continuum because of certain events occurring in those parts. It is "relational" in that it rejects the view that spatial position is a "pure quality" which determines the spatial relations of the particulars possessing it; it asserts instead that position of a thing merely is its property of having certain spatial relations to other things. This position, as Mr. Broad points out, departs somewhat from that usually held by either of the contending parties in the controversy over absolute space and relativity.

Spatial relations, on this view, are not merely subsistents. They have concrete existence. Providing this is recognized the three categories of naturalism which Mr. Dennes has distinguished will suffice for our purposes. It must be recognized, however, that these categories are merely the basic *classifications* within which all our terms fall. The terms that fall within them can ultimately be distinguished only by their empirical referents. These, however, can not be confined, as Mr. Dennes seeks to do,[21] to sensible entities. Mental qualities such as *pleasure* are not merely sensory data. Neither are mental events such as *anticipation*. These terms are just as intelligible in intersubjective intercourse as are such terms as "color" and "push." Everyone knows to what a man refers when he says that he *anticipates pleasure* when he takes up an interesting book. Yet no sense datum or combination of sense data will constitute that pleasure; it is a misleading misnomer to call it a "sensible entity." Similarly, the anticipation of which he is conscious is neither a sense datum nor sense image, nor any relation or change of relations among such data or images. It is the unique act of looking beyond existing data to something that

[20] C. D. Broad, *Examination of McTaggart's Philosophy*, Vol. II, pp. 239–244. Cambridge, The University Press, 1938.

[21] *Naturalism and the Human Spirit*, p. 271.

does not yet exist. To call such an event a "sensible entity" or "physical event" is equally a misleading misnomer. The unique distinctions among events must therefore be kept distinct, as must the distinctions among qualities and among relations. We must not invent terms without referents, but neither must we obscure the distinctions among referents by an ambiguous use of terms.

The conclusion, therefore, of this paper is that contemporary naturalism is right in claiming that all philosophical problems, so far as they are soluble at all, can be dealt with by the scientific methods of observation, classification, and inductive inference. Some of the required hypotheses can not be tested by prediction and verification but all can be tested by the methods of sound analogy, progressively exhaustive analysis of the possibilities, progressive completeness of explanation of relevant facts, and simplicity of hypothesis. The faults of contemporary naturalism lie chiefly in the realm of *observation*, in inadequate initial analysis of the phenomena, overlooking relevant differences. I submit that, if this task is thoroughly carried through, naturalism will have to abandon its neo-materialism as it has abandoned the materialism of the nineteenth century. It will find it just as untenable to assert the primacy of matter as it has shown to be the case with idealism's assertion of the primacy of mind. It will have to assert instead the primal nature of the distinct types of process that enter into the structure of both. Some part of the evidence for this I have presented here and I hope to present more in later papers.

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THOUGHTS ON THE PROBLEM OF MECHANISM

THE notion of mechanism has had a long and chequered career in the history of thought. Sometimes hailed as an all-embracing principle, sometimes rejected as hopelessly outmoded, it presents a curious blend of familiarity and confusion. The behavior of what we call material objects is one of the main features of ordinary experience; the extension of the principles governing that behavior to all the visible universe was the triumph of Newtonian mechanics; the adapting of them to the making of every sort of machine has in the last century vastly transformed the conditions of our lives. The scope and the manifold extension of this view of things sufficiently account for its appeal; they also account for our thinking that we understand it better than we actually do. After all, there are wide gaps between the solar system, a steam engine, a cyclotron, and the human body; and we

can believe that certain general principles apply to them all without necessarily concluding that they are all of a piece. To consider the differences between them may provide useful points of departure for a clearer idea of what may be called the mechanical view of the world.

Historically, no doubt, the idea of mechanical regularity originated in observation of the heavenly bodies and their associated seasons, after their motions had come to be thought of as dependent on the elements of which they were composed—a stage reached in the philosophy of Aristotle. Concerning such a system, one may ask what makes it run, and why it does not wear out. To both these Aristotle had answers; he was convinced that the heavens were formed of a body "separate from those around us here, and of so much more precious a nature as it is farthest removed from things here," an *aither* which by its very name, as he interprets it, "always runs," and in which no change has ever been observed.[1] These two notions, of unchanging motion and unchanging matter, long dominated European thought. The incorruptibility of the heavens, indeed, did not survive the astronomical discoveries of the early seventeenth century; but the unchanging matter, now provided with a corpuscular base, was extended to the whole universe by Newton, and passed on to his successors as a necessary support of the mechanical view.

But even if the atoms are so hard as "never to wear or break in pieces," as Newton supposed, the question of what keeps them moving had still to be faced. Boyle thought that they did so "by virtue of the general and primitive contrivance of the whole engine"; Newton, on the other hand, thought that the motion in the world was always decreasing, and needed active principles to recruit it. Hence arose the controversy between those who held that God so framed the universe that it continued to run of itself, and those who held that it was in need of at least occasional intervention to keep it in order. Decision on the point seems to be more a question of taste than of logical evidence, depending on the traits which we think it suitable to assign to the exercise of divine power. We may differ about the origin to be ascribed to the universe; the only certainty about it is that it has not run down yet.

While this question remained undecided, great progress was being made in the exact mathematical formulation of celestial movements, culminating in the work of Laplace. It then seemed possible to extend the grasp of such movements to the world about us, and to hold that a knowledge of the masses, positions, and velocities of its particles at any instant would enable us to calculate

[1] *De Caelo*, I, ii and iii.

their values for any other time. This, as Laplace himself recognized, is only an ideal; it can be applied only to bodies on the same level, and extensively observable within suitable times. Planetary motions are obviously the best case, and Laplace was able to deal with them fairly exhaustively, though not all the components of the solar system were known to him; but to extend such a study to all the particles of the earth, much less to all the particles of the universe, is obviously impossible, since not all of them are observable, and every "present" is severely limited. Nevertheless, as an ideal, it had its place in determining the general attitude of much scientific thought in the nineteenth century.

The notion of indestructible particles combined with this idea to furnish a scheme of things which would run of itself, or at least (if allowance be made for such factors as tidal friction) run down so slowly that the change over any fairly short period could be disregarded. By this stability it also provided a scheme for prediction. To be sure, not all the predictions that could have been made were made, and some of those which were made went wrong; but on the whole a framework was established which seemed wholly adequate to the accommodation of present and prospective knowledge. Yet Clerk Maxwell, writing in 1874 for the *Encyclopedia Britannica*,[2] uttered a strangely prophetic warning:

> The constitution of an atom, however, is such as to render it, so far as we can judge, independent of all the dangers arising from the struggle for existence. Plausible reasons may, no doubt, be assigned for believing that if the constants had varied from atom to atom through any sensible range, the bodies formed by aggregates of such atoms would not have been so well fitted for the construction of the world as the bodies which actually exist. But as we have no experience of bodies formed of such variable atoms this must remain a bare conjecture.

Within a generation this conjecture was turning into solid fact, extended by every year's discoveries. Radio-activity, the electron, isotopes, atomic fission, have made familiar the idea of elements with a very definite life-span, and the eternal atom has joined Aristotle's unalterable heaven in the limbo of forgotten concepts, as both natural and artificial transmutation have become everyday matters. It is not surprising that such an overturning of old ideas has led some to believe that the older notion of mechanism has vanished with them. In some fields this may be the case; certainly the atom is no longer what the nineteenth century supposed it to be. At the same time, many of the familiar elements and their compounds remain sufficiently stable to allow a con-

[2] Also in his *Collected Papers*, II, 483. Cf. also the *Life* by Campbell and Garnett, p. 390.

tinuance of many activities in their previous shape. To decide the real status of mechanism, we must turn to another aspect of the matter, that of the man-made machine.

Machines and their results have become so widespread in little more than a century that we are prone to take them for granted, and to forget how slow was their early development.[3] The age of Newton saw mainly the improvement of clocks (needed for more accurate astronomical observations) and the application of clockwork to ingenious but merely decorative automata. It required decades for the steam engine to pass from a modest aid to pumping to something which could run freely on rails or water, or provide previously undreamed of amounts of power. From about 1832, however, the pace quickened; water and steam turbines, electric dynamos, gas engines, followed each other in rapid succession and found ever fresh applications, at the same time that production and distribution of power became of steadily increasing importance. The problems of controlling such power and handling it to the best advantage have a large but often forgotten place in mechanical development.

It is not safe to assume that mere familiarity with machines gives us adequate knowledge about them. As a matter of fact, the precise definition of a machine is not easy to frame. It clearly operates in accordance with mechanical principles; but is everything that so operates a machine, and do mechanical principles always fully account for its behavior? A standard engineering text[4] yields this definition: "In general, it may be properly said that a machine is an assemblage of parts interposed between the source of power and the work, for the purpose of adapting the one to the other." A machine, that is, requires power to set it to work, and its work produces something. Often this is an actual object, such as a pair of shoes or a book; often, however, it is not. Certain machines produce only power to be conveyed elsewhere to drive other machines; certain others, often called instruments, produce nothing tangible, and do not in any direct way convert power into work, though they may operate on mechanical principles as much as any other devices.

The notion of an "instrument" will repay scrutiny. It often depends on small and accurately adjusted parts, or indicates the presence of very small forces, the effects of which it magnifies by appropriate means. This fits it for becoming, in Clerk Maxwell's words, "a piece of apparatus constructed especially for the per-

[3] Cf. A. P. Usher, *A History of Mechanical Inventions* (1929).

[4] Schwamb, Merrill and James, *Elements of Mechanism*, p. 1.

formances of experiments''; but such a meaning is too narrow. Many optical and electrical instruments, for instance, are used not to perform experiments but to gain information; they tell us more about a given situation than we could learn without them. This clearly distinguishes them from power producers on the one hand and product producers on the other, and sets them in a distinct category. Again, surgical and musical instruments permit delicate manipulations; but a successful surgical operation is more than an experiment, and music as a whole is scarcely to be classed as experimental. The point, for general human purposes, appears to be that all devices produce a result; but the result may be an object, a condition, or a piece of information, and to call all the producers ''machines'' is to confuse both their modes of operation and their ultimate purposes.

Essentially, a machine is an outgrowth of human activity at the perceptual level. As man looks about him, he tries to better his condition by utilizing his ability to move things around, by employing and improving tools, and finally by gaining control of as many natural forces as possible. In these endeavors he develops instruments to give him more accurate and extensive knowledge of the materials with which he has to deal, often arriving at discoveries which were entirely unexpected, and have opened the way to new applications. At any given time, however, his efforts are conditioned by the materials which he has at hand, and many machines can not be constructed until materials capable of meeting the new demands have been created. The earlier forms of iron, for instance, could not have been used in a modern steam engine; and the development of new alloys has been a powerful factor in the growth of mechanisms of all sorts. A satisfactory machine can not be constructed out of whatever comes to hand.

To the ordinary user, who is inclined to take motive power for granted, since usually he does not himself provide it, a machine is something which can be controlled according to his desires, and which can be taken apart and reconstructed. It must not be forgotten that the wide diffusion of machinery has depended on standardized and interchangeable parts, which facilitate repair when a machine gets out of order, as it has a marked tendency to do. It can also, to a large degree, be controlled without detailed knowledge of its structure. Bacon's design to ''level all intellects'' has been fulfilled not in inventors but in users; anyone may, by pressing a button or throwing a switch, produce effects of great magnitude—sometimes unintentionally. Finally, different classes of machines may not work in harmony, but may give rise to conflicts which are not explicable from the nature of the

machines themselves, and which may have important social consequences.

Examples of such conflicts may be had for the mere looking. The early inventors of motor-cars probably did not think that they were providing bank-robbers and kidnappers with a useful aid to their activities; yet that was certainly the case. The different modes of transportation, from railroad to airplane, have not existed quietly side by side, but have engaged in vigorous and sometimes violent competition. Sometimes one device drives out another, as steam vessels superseded sailing ships, or as motor busses have largely replaced street-cars; sometimes attempts are made, more or less successfully, to regulate conflicting interests by some sort of commission. On the whole, however, each type of machine tends to seek its own way, in a fashion which recalls the biological struggle for existence. We are at present seeing the untoward results of the multiplication of ways of using petroleum without any consideration of what ways are the most advantageous, or of how the supply of motive fluid is to be maintained.

This state of affairs is in the sharpest possible contrast to the cosmic mechanical ideal. There seems no sense in which the solar system, for instance, could be said to get out of order, since there is no work which it seems designed to perform. Various of its features, to be sure, conduce to the existence of life on the earth, but many others seemingly do not. It is hard to suppose that the number and distances of the planets have such a connection, or that terrestrial conditions depend on the asteroids. Again, certain celestial bodies, our moon among them, have had their motions altered by tidal friction in a way which might be described as "running down," and all the planets may ultimately be reabsorbed in the sun; but such a result, when or if it occurs, might be simply the result of conditions initially established, describable as a mechanical consequence, but not to be evaluated in mechanical terms. It could only be ordered or disordered in the light of very different considerations, which do not belong to the present discussion.

Thus the ordinary man's mechanical ideal, though it may be tinged by faint recollections of the cosmic regularity, is essentially based on something that "runs like clockwork," with a minimum of outside interference. It is also likely that this ideal is unconsciously affected by the self-regulating and self-repairing features of the human body, which seem to be effected with a minimum of conscious intervention, or even none at all. In practice, however, he knows that an actual machine always requires more or less steady maintenance and adjustment, which have to be provided from outside, even if it does not definitely get out of order

and require a general overhaul. On the bright side, he hopes that his machine will give all that it can; on the dark, he is prepared to find that it does not always live up to expectations, or even that it may give out at a critical moment.

When this ideal is extended, as often happens, to conditions which are not strictly mechanical, the conflict between the two aspects may appear sharply. We tend to call a "machine" anything which helps a driving force to yield a uniform product, though neither force nor product may be mechanical in the original sense. A political machine is supposed to produce votes in support of its managers; and so we speak of the machinery of banking, of government, or of any other activity from which we expect to get uniform repeatable results. But in human affairs both the motive power and the means of utilizing it are subject to unexpected fluctuations. History abounds in examples of great enthusiasms which petered out, and of grandiose plans which failed because of imperfect executants. To produce work, a force must be constrained; but the constraints must be adapted to the end in view, neither too stringent nor too loose.

In short, it is much easier to desire that an institution should function uniformly and efficiently than it is to implement that desire. To take a current example: the *London Economist* urged last September that the United Nations needed more competent and authoritative members—"men who in their own countries would be either in the Cabinet or at the head of the civil service." Passing over the question whether the ablest men of any country are necessarily found in the Cabinet, there is still the question whether men of high calibre may not prefer to display their talents at home rather than in a body which is brought into contact with problems all over the world, but not supplied with means of solving them. This same problem of finding the right man for the right place besets every large-scale plan, and many smaller ones. It is consoling to think that the right man will always somehow turn up; but when he does not, the working of the original scheme can not be expected to proceed with unfailing vigor and accuracy.

In the field of human institutions, then, the application of the mechanical ideal has at best only the value of an analogy; does it accomplish more in another field, that of living things? For many years, the notion of a "living machine" was held to be significant; but no living creature can be taken apart and put together again, and surgery, despite recent successes, is only occasionally able to replace a damaged organ by a new one—which,

incidentally, it can only transplant, not create. Again, the body obviously contains optical instruments in the eyes, and acoustic instruments in the ears; but no one, as Sherrington observes,[5] would try to make an optical instrument out of albumen, salt, and water—which is what the body does. The organs of each animal species are adapted in many ways to the requirements of that species, often as very interesting special devices; but no such device is acquired by another species, as a human invention can be used by others than its inventor. The quills of the porcupine, or the odor-glands of a skunk, are peculiar to those creatures; the power to produce and store electricity is confined to certain eels, catfish, and rays.

In somewhat the same way, the calculating machines which have been devised to shorten the labor of computation are, in their simpler forms, easily transferable; but the electronic types designed to deal with higher problems require elaborate setting up, and also foresight of how the problem is to be dealt with. As a recent worker in the field puts it,[6] "It can only do strictly and precisely what it is told to do; the decisions on what to tell it to do, and the thought which lies behind these decisions, have to be taken by those operating it"; and again, "One thing which I learnt from practical experience is the importance of taking what I might call a 'machine's-eye view' of the problem as furnished to it; and this is not so easy as it sounds. . . . Experience of ordinary computing may be misleading, because of the instinctive use of intelligence which a human computer makes as a matter of course, and which the machine can not make on its own initiative."

In general, it is worth noting that increasing complexity in a machine does not lead to any self-induced power of regulation; whatever is done in this way has to be built into it at the start, whereas even fairly simple organisms are able to accomplish much in this respect with a small expenditure of energy. It has been stated that the nervous system of a frog, if operated by vacuum tubes, would require the energy of Niagara to keep it going. It is rather difficult for man-made machines to challenge the abilities of organisms on their own ground. Mr. Waldemar Kaempffert not long ago observed,[7] "Photosynthesis is a fundamental natural process; but it is very inefficient." Inefficient for whom? Not, presumably, for the plant which is kept alive by it; only in the respect that a speeding up of the process might be convenient for

[5] *Man on His Nature*, p. 121.
[6] D. R. Hartree, *Calculating Machines* (1947), pp. 20–23.
[7] In the New York *Times* of January 4, 1948.

human beings. It is possible that such a speeding up might in this case be effected; in other cases it seems less likely. But in any case, what is attempted or accomplished must be considered from a purely human point of view, not as something which comes about on its own account.

It seems fair to conclude that the mechanical ideal is of more use as a descriptive device and a supplier of analogies than it is as a means of explanation. On the positive side, it suggests the advantages of close and efficient workmanship; on the negative, it runs the risk of suggesting that desired ends can be secured without constant attention to means and motive power. Without enlarging on the application of this to human institutions, we may observe that it does not much help us to understand the most characteristic living actions. No man consistently treats himself as a machine; and the attempts to treat others as such usually break down. We do not govern a machine by rewards or threats, or even by appealing to its better nature; but even a domestic animal is not unaffected by such considerations. A recent suggestive essay by A. R. Ubbelohde[8] points out that for unit processes the comparison between a constructed mechanism and a creature may be close, but as the complexity of the sequence of processes within the organism is better understood, the gap widens, and mere randomness or molecular spontaneity is inadequate to cover them all.

If we take "uniform[9] repeatable results" as a first criterion of mechanism, we find it verified in ordinary machines and instruments, subject to the possibility of adjustments or of running down; but outside that field we must often infer a mechanism from the results. We "want to see the wheels go round," and insist that there must be wheels, even if they are not visible; but sometimes further scrutiny reveals them, sometimes it does not. In the latter case, we have the alternatives of thinking that they must be there, awaiting later discovery, or of thinking that they do not exist; but so strong is the feeling in favor of mechanism that the first alternative has usually been chosen, even where some trends of scientific opinion incline to the second. It may be a more attenuated mechanism than that which fluorished in the latter part of the nineteenth century; but it still maintains itself even in the face of new discoveries and standpoints.

There is one good reason for that influence, which has not been affected by the passage of time, namely, that the instruments which

[8] *Time and Thermodynamics* (Oxford, 1947), pp. 93 ff.

[9] Not, of course, excluding moderate variation within determined limits.

have given us our new knowledge of the physical world have been devised and constructed on the same principles as any of their predecessors. They have been brought to an amazing degree of accuracy; they have revealed new kinds of rays and particles undreamt of a scant half century ago; but they have had to be machined and adjusted not otherwise than their more modest predecessors. The first electromagnet or vacuum tube had in them the potentialities of their present-day descendents, and the latter no less than the former had to be made out of similar materials, and by similar processes, and they have to be used by actual men. We have learned how to create beams of charged or uncharged particles, and to aim them at suitable targets; but the process is not unlike that of providing a machine-gun with proper ammunition, and "electron gun" is an accepted term.[10] Nor should it be forgotten that the choice of a suitable target must be made by testing different materials under varied conditions—in short, by the good old method of trial and error.

Machines in general, then, and instruments in particular, are parts of *la condition humaine*, the human predicament; and they have their place there, whatever may be their relation to the world of living things or to the universe as a whole. New ideas have demanded new instruments; new instruments have brought new discoveries; and it is often hard to say which has led the way, just as it is hard to disentangle the shares of pure science and of practice in the spread and improvement of inventions.[11] Just at present, the claims of theory have received their full share of admiration, if not more; what is needed as a counterpoise is a greater sense of the extent to which conflict of mechanisms has led to needless waste, or to the progressive exhaustion of natural resources. In the fields of applied science and human relations alike, the great question of the immediate future may well be whether the complexities of mechanism have not outrun the supply of motive power and the capacities of assimilation.

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[10] See, e.g., *Reviews of Modern Physics* for July, 1946.

[11] "The position is not simple. For example, many 'pure' researchers have almost a mechanic's view of their apparatus. But then a mechanic's view is not entirely a mechanical one; his way with a machine may resemble that of a groom with an animal: instinct, not reason, may rule," H. T. Pledge, *Science since 1500*, pp. 149–150.

BOOK NOTES

The Significance of Beauty in Nature and Art. HERBERT ELLSWORTH CORY. Milwaukee: The Bruce Publishing Company. 1947. xv + 248 pp. $4.00.

This book is of interest to secular students of philosophy primarily as an item in the documentary history of the continuing Catholic-Thomistic revival. It exhibits most of the familiar traits of this revival, though in an unusually extreme and unguarded form. There is the familiar ranting against nearly all of modern secular philosophy and culture; there is the usual charge of "subjectivism" and the insistence that only in Thomism is this scourge overcome; there are the usual blasts at Descartes, the arguments *ad hominem* and the *ignoratio elenchi* which are so peculiarly annoying; and finally there is the strange and rather terrifying assurance and finality which characterizes so much of this literature.

Actually the work is very largely an apologetic for the faith that the beauty which is present in works of art is a revelation of the Christian God. It is also something of a personal celebration of Professor Cory's conversion to the True Faith. In so far as it belongs to philosophy, it is primarily as a discussion of the ontological status of the object of esthetic contemplation and its cosmological implications.

In saying this, however, one may also grant to the book, and to its primary authority, a certain understanding of the nature and structure of artistic creation and esthetic contemplation. Cory's trenchant, if commonplace, criticisms of the intuitionism of Croce and Collingwood show a grasp of the inadequacies of idealistic esthetics generally. In another context, and with another orientation, the Thomistic definition of beauty might lead to genuinely fruitful reflection upon the empirically observable facts of art and appreciation. As it is, such insights have little opportunity to obtain a sympathetic hearing.

There is nothing more to be said here, for to say more would be to write a book. I will conclude, therefore, with the following reflection, occasioned by Cory's ontologizing about the status of objects of esthetic intuition. Suppose that two individuals, *A* and *B*, should experience a certain *X*, the contemplation of which gives them both a recognizable pleasure. Let them also agree in their description of their experience. But *A*, who is a follower of Aquinas and Plato, regards it also as the revelation of the Divine Being, whereas *B*, who is an empiricist, refuses to raise any question as to the metaphysical significance of his experience on the ground of its irrelevance to esthetic theory in particular and its

lack of verifiable meaning in general. Now, I submit that there would be no difference between these individuals either as experiencers of art or as estheticians. It is only subsequently, when they speculate or refuse to speculate about the ulterior significance of art which is not disclosed by inspection of the data themselves in any case, that the serious differences between them emerge. This suggests, perhaps, why it is that there can be considerable agreement between the Thomist and the empiricist at the level of phenomenological analysis or phenomenal definition, and yet such profound and irreconcilable opposition between them over the metaphysics of beauty. The latter, I maintain, does not belong to esthetics itself, and whatever the merits of the issue, it is one upon which no examination of works of art or of esthetic objects generally can shed any light whatever.

H. D. A.

Historia de la Filosofía en Hispanoamerica. RAMÓN INSÚA RODRÍGUEZ. Guayaquil: Universidad de Guayaquil, Departamento de Publicaciones. 1945. 203 pp.

The author, a professor in the University of Guayaquil, knows that to write a history of philosophy in Latin-America is not exactly the same as to write a history of European modern philosophy; the former requires, much more than the latter, a complete description of the historical background. He has managed not to forget any of the essential points of the political, social, and, of course, cultural history of America south of the Rio Grande. Dr. Ramón Insúa Rodríguez begins with the discussion of the moral problems concerned with the Conquest and its philosophical implications, goes on with the development of scholasticism in the colonial period, and does not omit the remarkable fact of the expulsions of Jesuits from Spain under Charles III. The history naturally follows with encyclopaedism and French influences, discussing many questions about social and economic ideas that were really, still largely are, the "living thoughts" of America. The last two chapters are devoted to the more strictly philosophical work, which, as is known, has appeared in all Latin-American countries in surprisingly synchronized outputs: "ideology," eclecticism, spiritualism, sensualism, and positivism, which is, of course, still closely connected with social and political problems and which gives way to the more "technical" recent trends in philosophy. These, however, the author thinks not necessary to explain, except in a few instances, particularly the critique of positivism by the outstanding Argentine philosopher, Alejandro Korn.

These lines will give the reader an idea of the scope of the book. Of course, it is not to be expected that in two hundred pages many problems concerned with historical difficulties or with basic philosophical issues can be discussed at length. It is enough of an achievement to make such a concise and sober digest of very rich material. Dr. Ramón Insúa Rodríguez may be assured that his book will awaken the interest of scholars and the general public for such a virgin field, and also that it will contribute to an historical clarification of a very tangled process. The book is, therefore, highly to be recommended, and even brings to light more than one point which is, consciously or not, ignored or avoided by the usual historian of Latin-America, too much concerned either with his own country, or with historical details of only political significance. The title of the book is, however, somewhat misleading; it is not so much a history of philosophy as a history of ideas, in the current sense of the word. We do not find here, except occasionally, a description of the contents of philosophical ideas themselves. Nor do we find a sufficient emphasizing of the rôle played by ideas in the further development of history. We recall in this connection a very plausible theory of Bertrand Russell, according to which ideas are not only effects of history, but also causes of history in a very broad sense of the word "cause." But these faults are not entirely Dr. Insúa Rodríguez's. He has not pretended to do such an overwhelming work; perhaps this task is impossible in the case of Latin-American history of ideas, if we remember the very particular nature of this history. In any case, his book will be very welcome, and nobody can doubt that it contributes a serious, clear, and systematic insight into the history of philosophy in Latin-America. It is to be expected that Dr. Insúa Rodríguez's work will not be overlooked by those who are interested in these problems.

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Illuministi, Giansenisti e Giacobini nell'Italia del Settecento. ERNESTO CODIGNOLA. Firenze: "La Nuova Italia." 1947. 363 pp. 800 lire.

Jansenism and its struggle against the Jesuits and for a deeper religiosity in the bosom of the Catholic Church reached its climax with Pascal's *Provinciales,* with the educational reform and the logic of Port Royal, then disappeared from sight, even before the bull *Unigenitus* (1707) had put the quietus on its open and resounding battle. But a Jansenist tradition went on independently

from the theological problem of predestination (its first moving spirit) as a rather vague aspiration of the French clergy towards national independence from Rome and as an almost subterranean current of earnestness, of deeper interest for fundamental questions, with the attempt at substituting a vernacular liturgy for the Latin one, in Italy. Here the secularist climate of the middle of the eighteenth century gave it a chance to originate a short-lived reform experiment in Tuscany. But Jansenist ideas and aspirations may be traced in the writings and private letters of many obscure priests and learned men throughout the eighteenth century. On the other hand Jansenism was overshadowed by the prevailing currents of enlightened anti-clericalism and of revolutionary Jacobinism. Dr. Codignola, Professor of Pedagogy in the University of Florence, has devoted his learned activity to the unravelling of this trend in the Italian thought and life of the eighteenth century. This voyage in uncharted seas has brought him from Jansenist movements in Tuscany to Jansenist aspirations in the Genoese clergy. His tireless research in forgotten corners of the archives and his reconstruction of the leading lines of this spiritual movement have revived for Italy a hitherto unknown accomplishment in the realm of the spirit. This book is a collection of essays which give a fair idea of Professor Codignola's discoveries. The student of religious history will find here an incentive towards the perusal of the big volumes of documents edited by Professor Codignola and published by the same publisher.

M. M. R.

Interpretation and Preciseness. I. Survey of Basic Concepts. ARNE NÆSS. Oslo: University Student-Office Printshop. 1947. 54 pp. (mimeographed).

This monograph is the first one of a series published in English scrutinizing a philosophic trend which may be called *The Oslo Group*. It has much in common with pragmatism, logical empiricism, and logical analysis of the Uppsala School, Sweden. But it differs from these trends in that it voices and emphasizes a logical theory of interpretation and preciseness that is confirmable by means of systematic observation under standardized conditions.

The author uses the questionnaire technique of the public-opinion polls and statistical evaluation of the results, in order to determine the conception of philosophic utterances held by several groups of the population. In this essay mainly students of philosophy at the freshman-level were used as test persons. The author has done extensive work along this line and it has been

motivated by his conviction that "many fields in psychology, sociology, political science, public opinion, law, literary criticism" and philosophy, "may directly profit by investigations as those planned" and to some extent done by the Oslo Group and in this monograph.

The writer points to the present discord between the broad claims and aspirations of enthusiastic writers of "semantics" and the narrow scientific basis for the claims.[1] He feels that the so-called analytic trends in contemporary philosophy "either will give birth to scientific disciplines covering their activities or will have to give up" their basic aspirations.

In the first part of the monograph the writer tries to work out a basis of terms suitable for a scientifically grounded and empirically confirmed theory of interpretation, specification, and meaning. He discusses and elaborates the relations between terms such as *synonymity, homonymity, interpretation, specification,* and *preciseness.* In order to clarify the exposition he occasionally uses elementary symbolic logic.

The second part deals with empirical procedures of elementary logical analysis, procedures that are presupposed in semantics or semiosis. The third part stresses the importance of how to measure degrees of ambiguity, vagueness, and similar properties of logical investigation.

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LOS ANGELES

CURRENT JOURNALS

MIND. Vol. LVII, No. 227. A. N. Whitehead: The Last Phase: *Dorothy Emmet.* The Meaning of Some Metaphysical Propositions: *S. Körner.* Differences: *J. B. S. Haldane.* The Function of Philosophical Aesthetics: *W. B. Gallie.* Some Arguments against G. E. Moore's View of the Function of "Good" in Ethics: *Pepita Haezrahi.* Discussions—Can We Plan for Social Progress? *A. M. Mardiros.* Dispositions: *A. D. Woozley.* Mr. Strawson on Necessary Propositions and Entailment Statements: *S. N. Hampshire.* Pragmatic Paradoxes: *D. J. O'Connor.*

THE REVIEW OF METAPHYSICS. Vol. I, No. 4. The Year 1800 in the Development of German Idealism: *Richard Kroner.* Pragmatism and Existence: *Otis Lee.* The Metaphysics of William Ockham: *Philotheus Boehner.* Immortality: *Paul Weiss.* Review-Article—A. C. Ewing's The Definition of Good: *Richard Robinson.*

[1] Cf. the papers by Bentley and Dewey in this JOURNAL, 1945, 1946, and 1947, which apply to the same problem as that of Dr. Næss.

THE AUSTRALASIAN JOURNAL OF PHILOSOPHY. Vol. XXVI, No. 1. Logical Positivism (III): *J. A. Passmore.* The Nature of Analytical Jurisprudence: *F. C. Hutley.* The Undialectical State—A Study in Marxist Political Theory: *S. Dominitz.* Discussion—Preface to a Future Metaphysic: *H. Hudson.*

FILOSOFIA Y LETRAS. Tomo XIV, Número 28. La evolución de la física, como serie monótona creciente de inventos conceptuales: *Juan David García Bacca.* La teoría de las pasiones en Descartes y en la tradición filosófica: *Antonio Gómez Robledo.* Ser, valor y existencia: *Aníbal Sánchez Reulet.* El pensamiento ético de José Vasconcelos: *Oswaldo Robles.* La Universidad de Justo Sierra: *Juan Hernández Luna.* Antecedentes historicistas en Hispanoamérica: *Leopoldo Zea.* Diez años de poesía española: *Vicente Gaos.*

THE NEW SCHOLASTICISM. Volume XXII, Number 3. Pessimism in Philosophy: *Paul Siwek.* Chance and the Fortuitous in a Philosophy of History: *L. A. Foley.*

THE THOMIST. Vol. XI, No. 3. What the Modern Man Should Not Believe: *Pierre Conway.* Existentialism and Existence, Part II: *V. E. Smith.* The Basis of the Suarezian Teaching on Human Freedom: *T. U. Mullaney.*

GIORNALE DI METAFISICA. Anno III, N. 3. Conquista dell'uomo: *M. F. Sciacca.* Maine de Biran: *M. T. Antonelli.* Il "metodo riflessivo" di Jules Lagneau: *G. M. Sciacca.* Nota su Rosmini: *A. Carlini.* Il pensiero di T. Valperga di Caluso e i suoi rapporti col pensiero di A. Rosmini: *Fidia Arata.* Discussioni—La filosofia e lo spirito cristiano: *Renato Lazzarini.*

NOTES AND NEWS

The Joint Session of the Aristotelian Society and the Mind Association took place at University College, Durham, July 9–11, 1948. The program was as follows: Ethics without Propositions: *W. F. Barnes.* Symposium, "Are All Philosophical Questions, Questions of Language?": *S. N. Hampshire, A. E. Duncan Jones, S. Körner.* Symposium, "The Emotive Theory of Ethics": *Richard Robinson, H. J. Paton, R. C. Cross.* Symposium, "What Can Logic Do for Philosophy?": *K. R. Popper, W. C. Kneale, A. J. Ayer.* Symposium, "Things and Persons": *D. M. MacKinnon, H. A. Hodges, John Wisdom.*